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PCT/KR2004/000860

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 02 AUG 2005



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| Applicant's or agent's file reference PCA40212-MNT | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/KR2004/000860 | International filing date(day/month/year) 14 APRIL 2004 (14.04.2004) | Priority date (day/month/year) 14 APRIL 2003 (14.04.2003) |
| International Patent Classification (IPC) or national classification and IPC IPC7 G03F 7/027 | | |
| Applicant MINUTA TECHNOLOGY CO., LTD. et al | | |

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 4 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:
 - ☒ Box No. I Basis of the report
 - ☐ Box No. II Priority
 - ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Box No. IV Lack of unity of invention
 - ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Box No. VI Certain documents cited
 - ☐ Box No. VII Certain defects in the international application
 - ☐ Box No. VIII Certain observations on the international application

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| Date of submission of the demand 14 FEBRUARY 2005 (14.02.2005) | Date of completion of this report 14 JULY 2005 (14.07.2005) |
| Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140 | Authorized officer SHIN, JU CHEOL Telephone No. 82-42-481-8156  |

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/KR2004/000860

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- ☐ This report is based on translations from the original language into the following language _____ which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☐ the international application as originally filed/furnished
- ☐ the description:
pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☒ the claims:
pages _____ as originally filed/furnished
pages* _____ as amended (together with any statement) under Article 19
pages* 14-17 received by this Authority on 14.02.2005
pages* _____ received by this Authority on _____
- ☐ the drawings:
pages _____ as originally filed/furnished
pages* _____ received by this Authority on _____
pages* _____ received by this Authority on _____
- ☐ the sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages _____
- ☐ the claims, Nos. _____
- ☐ the drawings, sheets _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

| | | | |
|-------------------------------|--------|------|-----|
| Novelty (N) | Claims | 1-11 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | 1-11 | YES |
| | Claims | | NO |
| Industrial applicability (IA) | Claims | 1-11 | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

1. Claims 1-11 of the present invention relate to an organic mold fabricated from a resin composition for micropattern, which comprises:

(A) 40 to 90 parts by weight of curable urethane oligomer having at least two reactive groups, acrylate, etc.,

(B) 10 to 60 parts by weight of a reactive monomer, acrylate, etc.,

(C) 0.01 to 200 parts by weight of a fluorine containing compound, fluorine containing resin, based on 100 parts of the sum of components (A) and (B), and

(D) 0.1 to 10 parts by weight of a photoinitiator, based on 100 parts of the sum of components (A), (B) and (C).

2. Reference is made to the following documents:

D1: EP 882 998 A1

D2: EP 421 027 A1

D3: JP1995-318706 A

D4: JP 1994-201903 A

D5: JP 1994-118205 A

Document D1, which is considered to represent the most relevant state of the art, provides a resin composition for a lens sheet. Also, each of documents D2-D5 discloses a coating composition or sheet, however, these documents define the general state of the art which is not considered to be of particular relevance.

3. Novelty

Each of documents D1-D5 discloses a few resin compositions, from which claim 1 of the present invention differs in the specific composition and the range of the composition. Therefore, the novelty of the subject matter of claim 1 can be acknowledged under PCT Article 33(2). Claims 2-11, which are dependent on or related with claim 1, also meet the requirements of PCT Article 33(2) with respect to Novelty.

(Continued on Supplemental Box)

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Box V.

4. Inventive step

Claim 1 of the present invention relates to a resin composition for micropattern, which comprises:

(A) 40 to 90 parts by weight of curable urethane oligomer having at least two reactive groups, acrylate, etc.,

(B) 10 to 60 parts by weight of a reactive monomer, acrylate, etc.,

(C) 0.01 to 200 parts by weight of a fluorine containing compound, fluorine containing resin, based on 100 parts of the sum of components (A) and (B), and

(D) 0.1 to 10 parts by weight of a photoinitiator, based on 100 parts of the sum of components (A), (B) and (C).

The specific composition range of the present invention for organic mold used in micropatterns can not be easily derived from the modification in the D1-D5 within the scope of the customary practice followed by persons skilled in the art. Moreover, the advantages such as having a micropattern cannot readily be foreseen. Consequently, the subject matter of claims 1 of the present application is considered as involving an inventive step under PCT Article 33(3). Claims 2-11, which are dependent on or related with claim 1, also meet the requirements of PCT Article 33(3) with respect to inventive step.

5. Industrial applicability

No opinion will be formulated with respect to the industrial applicability of this subject matter such as a resin composition for forming micropattern. (PCT Article 33(4)).

What is claimed is:

1. An organic mold for forming micropatterns, fabricated from a resin composition comprising:

5 (A) 40 to 90 parts by weight of an active energy curable urethane-based oligomer having a reactive group selected from the group consisting of (meth)acrylate, vinyl ether, arylether, and a combination thereof;

10 (B) 10 to 60 parts by weight of a monomer reactive with the urethane-based oligomer, having a reactive group selected from the group consisting of (meth)acrylate, vinyl ether, arylether, and a combination thereof;

(C) 0.01 to 200 parts by weight of a silicone or fluorine containing compound, based on 100 parts of the sum of the components (A) and (B); and

15 (D) 0.1 to 10 parts by weight of a photoinitiator, based on 100 parts of the sum of the components (A), (B) and (C).

- 20 2. The organic mold according to claim 1, wherein the active energy curable urethane-based oligomer used in the resin composition is selected from the group consisting of linear aliphatic, cycloaliphatic and aromatic urethane-based oligomers having at least two reactive groups, and a mixture thereof.

- 25 3. The organic mold according to claim 1, wherein the resin composition further comprises at least one reactive oligomer selected from the group consisting of a (meth)acrylated polyester, (meth)acrylated polyether, (meth)acrylated epoxy, (meth)acrylated polycarbonate, (meth)acrylated butadiene, and a mixture thereof, as a partial substituent of Component (A).

4. The organic mold according to claim 1, wherein the (meth)acrylate used as Component (B) in the resin composition is selected from the group consisting of isobornyl acrylate, 1,6-hexanediol acrylate, triethyleneglycol di(meth)acrylate, trimethylol propane triacrylate, tetraethyleneglycol di(meth)acrylate, 1,3-butanediol diacrylate, 1,4-butanediol diacrylate, diethyleneglycol diacrylate, neopentylglycol diacrylate, neopentylglycol di(meth)acrylate, polyethyleneglycol di(meth)acrylate, pentaerythritol triacrylate, dipentaerythritol (hydroxy) pentaacrylate, alkoxylated tetraacrylate, octadecyl acrylate, isodecyl acrylate, lauryl acrylate, stearyl acrylate, behenyl acrylate, styrenic monomer, and a mixture thereof.

5. The organic mold according to claim 1, wherein the vinyl ether used as Component (B) in the resin composition is selected from the group consisting of cyclohexyl vinyl ether, 2-ethylhexyl vinyl ether, dodecyl vinyl ether, 1,4-butanediol divinyl ether, 1,4-hexanediol divinyl ether, diethylene glycol divinyl ether, ethyleneglycol butyl vinyl ether, ethyleneglycol divinyl ether, triethyleneglycol methylvinyl ether, triethyleneglycol divinyl ether, trimethylol propane trivinyl ether, 1,4-cyclohexane dimethanol divinyl ether, and a mixture thereof.

6. The organic mold according to claim 1, wherein the aryl ether used as Component (B) in the resin composition is selected from the group consisting of aryl propyl ether, aryl butyl ether, pentaerythritol triary ether, and a mixture thereof.

7. The organic mold according to claim 1, wherein the silicone or fluorine-containing compound used in the resin composition is at least one component selected from:

- (i) a silicone-containing reactive monomer or oligomer selected from the group consisting of a silicone-containing vinyl derivative, silicone-

containing (meth)acrylate, (meth)acryloxy-containing organosiloxane, silicone polyacrylate, and a mixture thereof;

- (ii) a fluorine-containing reactive monomer or oligomer selected from the group consisting of a fluoroalkyl-containing vinyl derivative, fluoroalkyl-containing (meth)acrylate, fluorine polyacrylate, and a mixture thereof;
- (iii) a silicone or fluorine containing resin, or a mixture thereof; and
- (iv) a silicone or fluorine containing surfactant or oil, or a mixture thereof.

8. The organic mold according to claim 1, wherein the photoinitiator used in the resin composition is a free radical initiator selected from the group consisting of benzyl ketals, benzoin ethers, acetophenone derivatives, ketoxime ethers, benzophenone, benzo and thioxantone compounds, and mixtures thereof, or a cationic initiator selected from the group consisting of onium salts, ferrocenium salts, diazonium salts, and mixtures thereof.

9. A method for fabricating an organic mold, which comprises coating or casting a resin composition for the organic mold on a pattern face of a mastermold, placing a support on the resin layer, irradiating the resulting laminate with an active energy ray to preliminarily cure the resin composition, lifting off the organic mold having a reverse pattern face to that of the mastermold and integrally formed with the support from the mastermold, and completely curing the organic mold, wherein the resin composition comprises (A) 40 to 90 parts by weight of an active energy curable urethane-based oligomer having a reactive group selected from the group consisting of (meth)acrylate, vinylether, aryether, and a combination thereof; (B) 10 to 60 parts by weight of a monomer reactive with the urethane-based oligomer, having a reactive group selected from the group consisting of (meth)acrylate, vinylether, aryether, and a combination thereof; (C) 0.01 to 200 parts by weight of a silicone or

fluorine containing compound, based on 100 parts of the sum of the components (A) and (B); and (D) 0.1 to 10 parts by weight of a photoinitiator, based on 100 parts of the sum of the components (A), (B) and (C).

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10. The method according to claim 9, which further comprises adhering a soft or rigid backing having a curved or flat face to the bottom face of the organic mold.

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11. A method for fabricating an organic mold, which comprises coating or casting a resin composition for the organic mold on a pattern face of a mastermold, irradiating the resin layer with an active energy ray to preliminarily cure it, pouring a UV- or heat-curable resin composition onto the cured resin layer as a backbone, heating or irradiating the resultant to completely cure the resin and the backbone layers, lifting off the organic mold having a reverse pattern face to that of the mastermold and integrally formed with the backbone layer from the mastermold, and completely curing the organic mold, wherein the resin composition comprises (A) 40 to 90 parts by weight of an active energy curable urethane-based oligomer having a reactive group selected from the group consisting of (meth)acrylate, vinylether, aryether, and a combination thereof; (B) 10 to 60 parts by weight of a monomer reactive with the urethane-based oligomer, having a reactive group selected from the group consisting of (meth)acrylate, vinylether, aryether, and a combination thereof; (C) 0.01 to 200 parts by weight of a silicone or fluorine containing compound, based on 100 parts of the sum of the components (A) and (B); and (D) 0.1 to 10 parts by weight of a photoinitiator, based on 100 parts of the sum of the components (A), (B) and (C).

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